

## Claims

1. Electrical island network with at least one first power generator, which uses a renewable energy source, wherein the power generator preferably is a wind-power station with a generator, wherein a second generator is provided, which can be coupled to an internal combustion engine, characterized by a wind-power station, which can be controlled in terms of its rpm and blade position and which has a bus bar for feeding the generated energy into the network and a device connected to a bus bar is provided for detecting the power required in the network.
2. Electrical island network according to Claim 1, characterized in that the first power generator has a synchronous generator, which contains a converter with a dc voltage intermediate circuit with at least one first rectifier and an inverter.
3. Electrical island network according to Claim 1 or 2, characterized by at least one electrical element connected to the dc voltage intermediate circuit for feeding electrical energy with dc voltage.
4. Electrical island network according to Claim 3, characterized in that the electrical element is a photovoltaic element and/or a mechanical energy storage device and/or an electrochemical storage device and/or a capacitor and/or a chemical storage device as the electrical intermediate storage device.
5. Electrical island network according to one of the preceding claims, characterized by a flywheel, which can be coupled to the second or a third generator.
6. Electrical island network according to one of the preceding claims, characterized by several internal combustion engines, which can each be coupled to a generator.
7. Electrical island network according to one of the preceding claims, characterized by a controller for controlling the island network.
8. Electrical island network according to one of the preceding claims, characterized by a boost/buck converter (22) between the electrical element and the dc voltage intermediate circuit.
9. Electrical island network according to one of the preceding claims, characterized by charging/discharging circuits (26) between the electrical storage element and the dc voltage intermediate circuit.
10. Electrical island network according to one of the preceding claims, characterized by a flywheel with a generator and a downstream rectifier (20) for supplying electrical energy into the dc voltage intermediate circuit (28).
11. Electrical island network according to one of the preceding claims, characterized in that all of the power generators (10, 12) using renewable energy sources and intermediate storage devices (14, 16, 18) power a common dc voltage intermediate circuit.

12. Electrical island network according to one of the preceding claims, characterized by a network-commutated inverter.

13. Electrical island network according to one of the preceding claims, characterized in that the energy for operating the electromagnetic coupling is made available by an electrical storage device and/or by a primary power generator.

14. Island network according to one of the preceding claims, characterized in that a seawater desalination/service water generation plant is connected to the island network, wherein this plant generates service water (drinking water), when the power supplied by the primary power generator is greater than the power consumption of the other electrical loads connected to the island network.

15. Island network according to one of the preceding claims, characterized in that a pump storage device is provided, which receives its electrical energy from the primary power generator.

16. Electrical island network with at least one first primary power generator for generating electrical energy for an electrical island network, wherein a synchronous generator is provided, which has the function of a network generator, wherein the synchronous generator can here work in motor mode and the energy required for the motor operation is made available by the primary power generator.

17. Island network according to Claim 16, characterized in that the generator can be connected to an internal combustion engine, which is deactivated when the electrical power of the primary power generator is greater or approximately the same size as the electrical power consumption in the island network.

18. Island network according to one of the preceding claims and with a bus bar for feeding the generated energy into the network, characterized by a device attached to the bus bar for detecting the power required in the network.

19. Method for operation control of an electrical island network with at least one wind-power station, characterized in that the wind-power station (10) is controlled such that it always generates only the required electrical power as long as the consumption of the electrical power in the network is less than the electrical energy generation capacity of the wind-power station.

20. Method according to Claim 19, characterized in that when the required power is not met, the power generators (10, 12) using renewable energy sources first use electrical intermediate storage devices (14, 16, 18) for delivering energy.

21. Method according to one of Claims 19 and 20, characterized in that internal combustion engines are provided for driving at least one second generator, and the internal combustion engines are turned on only when the power delivered by the power generators (10,

12) using renewable energy sources and/or by the electrical intermediate storage devices (14, 16, 18) falls below a predetermined threshold for a predetermined period of time.

22. Method according to Claim 21, characterized in that for charging the intermediate storage device from renewable sources, more energy is generated than is required for the load on the network.

23. Method according to one of the preceding claims, characterized in that for overcoming frequency instabilities or deviations in the network power frequency from its desired value, preferably electrical intermediate storage devices are used for delivering energy, which can be frequently and quickly charged or discharged without significant irreversible losses in capacity.

24. Method according to one of the preceding claims, characterized in that intermediate storage devices of an accumulator block type or a battery storage device are used preferably to support the network when the power required by the network can be delivered not at all or only insufficiently from renewable energy sources.

25. Use of a synchronous generator as a network generator for a network-commutated inverter for feeding an alternating current into an electrical power supply network, wherein the generator works in motor operation and the drive of the generator is realized by a flywheel and/or by providing electrical energy from a renewable-energy power generator.

### Abstract

The present invention relates to an island network with at least one power generator, which uses renewable energy sources, wherein the power generator is preferably a wind-power station with a first synchronous generator, with a dc voltage intermediate circuit with at least a first rectifier and an inverter, with a second synchronous generator and an internal combustion engine that can be coupled to the second synchronous generator. To realize an island network, for which the internal combustion engine can be deactivated completely, as long as the wind-power station generates sufficient power for all connected loads at the highest possible efficiency, a completely controllable wind-power station (10) and an electromagnetic coupling (34) between the second synchronous generator (32) and the internal combustion engine (30) are provided.